

# Educational Innovations<sup>®</sup>

#XRY-125

## Real Human X-Rays

This complete set of x-rays has been reproduced from actual x-rays of living persons taken for medical reasons. The x-rays can be studied individually or arranged together to create a full human skeleton.

### Suggested Activities:

1. Assemble the entire skeleton on a large table or on the floor. Using white paper as a background increases visibility and protects the x-rays. You may want to tape the x-rays together and hang them in a window or against a white background on the wall.
2. Print out labels such as the ones shown below and ask students to identify parts of the skeleton.

carpus	neck vertebrae	sternum
clavicle	patella	tarsus
cranium	pelvis	teeth
femur	phalanges	tibia
fibula	radius	ulna
humerus	rib cage	vertebrae
mandible	scapula	
metatarsus	spinal column	

3. Demonstrate bone compression with two pieces of 8.5 x 11" paper. Roll one into a circular tube and fold the other into a triangular tube. Leaving the ends of the tube open, secure each tube with staples or tape. Place objects, weighing the same, on top of each tube until the tube collapses. Paperback books work well. Which tube holds more weight? This demonstrates the advantage of round vs. triangular bones.

### Background Information:

Bones provide a stable structure for our muscles and protection for some of our most important organs, like the heart and brain. They are made of calcium, phosphorous, and magnesium, along with collagen fibers. Most bones are hollow and contain bone marrow, a tissue that makes red blood cells.



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## Frequently Asked Questions:

1. How do bones grow?  
*Most bones have two growth plates, one at each end of the bone. These plates slowly grow outwards, making the bone longer and the person taller.*
2. How do male and female skeletons differ?  
*Although both male and female skeletons have the same number and type of bones, there are several slight differences. For example, the male jaw tends to be larger and the female pelvic bone is wider to allow for childbirth.*
3. How do human and primate bones differ?  
*Humans are a distinct group of primates called hominids. Hominids have a spine that is shaped like an S, broad chest cavities, and shoulder blades (scapula) that are located on their backs, behind the rib cage. Hominids are also the only primates that regularly walk on two legs. This trait is called bipedality. One indication of bipedality in the bones is the non-divergent big toe. Other primates have big toes that point out to the sides. Hominids have big toes that point straight ahead.*
4. What are X-rays?  
*X-rays are like pictures of your bones. Instead of using visible light to form an image on film, the X-ray technician uses a far more energetic form of electromagnetic radiation. X-ray radiation penetrates soft tissue, e.g. skin, muscles, and organs but cannot penetrate bones as easily. This means that your bones show up white on the film.*
5. Are these X-rays from the same person?  
*This set of x-rays came from a collection of x-rays taken of different people at different times. The people were approximately the same size. Each x-ray was taken for a specific medical purpose. Some are perfectly healthy bones; others are not.*

## Challenge Questions:

1. How many different bones can you count in these x-rays?
2. Can you discover a small bone tumor at the end of one bone?
3. When x-raying the hand and arm together, which direction should the thumb point: outward or inward? Why is this important?
4. Why are there lines on the top of the skull?
5. Can you locate the person's identification wristband?
6. What are the longest bones in the human body?
7. How are the arms and legs similar; how are they different?
8. Can you locate the soft organs (heart, kidney, liver, etc.) in the chest x-ray?